

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
WESTERN DIVISION

UNITED STATES OF AMERICA and
THE STATE OF OHIO

Plaintiffs,

v.

THE BOARD OF COUNTY
COMMISSIONERS OF HAMILTON
COUNTY, OHIO AND THE CITY
OF CINCINNATI, OHIO,

Defendants.

Civil Action No. C-1-02-107

DECLARATION OF MARK J. KLINGENSTEIN, P.E.
IN SUPPORT OF MOTION BY THE UNITED STATES FOR
ENTRY OF THE INTERIM PARTIAL AND CSO CONSENT DECREES

I, Mark J. Klingenstein, P.E., declare:

1. I am over 18 years of age, and competent to testify regarding the matters discussed herein. I am a senior environmental engineer employed by Science Applications International Corporation ("SAIC"). I received a Bachelor of Science in Civil Engineering from Drexel University in 1979, and a Master of Engineering in Civil Engineering from the Stevens Institute of Technology in 1989. I am a licensed Professional Engineer in the states of New Jersey, Indiana, and Arizona. A copy of my resume is attached to this declaration.
2. I have been employed as an environmental engineer since 1979, and have been employed by SAIC since 1981. As a senior environmental engineer with SAIC, I have provided expert technical support to USEPA and USDOJ on Clean Water Act enforcement cases for over ten years.
3. As part of SAIC's contract with USEPA's Office of Enforcement and Compliance Assurance ("OECA"), I routinely provide expert technical support to USEPA and/or USDOJ in Clean Water Act cases. For the past decade, the majority of the CWA cases I have supported have focused on collection system issues. These cases have involved both separate and combined municipal collection systems.

4. In particular, I am called upon to offer opinions regarding the state of defendants' collection systems, the causes of overflows from those systems, the appropriateness of remedial and control measures proposed by defendants, and to identify remedial measures and controls that will result in those defendants' compliance with the Clean Water Act.
5. Cases I have recently or am currently supporting have included: Metro Dade County, Florida; Youngstown, Ohio; Toledo, Ohio; Jefferson County, AL; City of New Albany, Indiana; San Diego, CA; Baltimore, MD; Washington, DC; Boston, MA; Portland, Oregon; Indianapolis, Indiana; Fort Wayne, Indiana; Louisville, Kentucky; and Borough of Indiana, Pennsylvania.
6. In each of these cases, I have provided expert technical support to the case attorneys and government technical staff. This support has involved participation in technical meetings and negotiations; and the review of various plans and submissions, including those provided as required by consent decrees. In particular, I have reviewed plans and reports provided by Youngstown, Ohio; Toledo, Ohio; New Albany, Indiana; and Anderson, Indiana, as required by their respective consent decrees.
7. As part of the aforementioned contract with USEPA OECA, I have provided support to USEPA, USDOJ and OEPA in the negotiation of the two proposed consent decrees with Hamilton County and the City of Cincinnati ("Defendants").
8. Over the past 8 years, I and other SAIC staff have provided USEPA and USDOJ a total of over 7,000 hours of technical support. This support has been provided under at least nine separate USEPA Work Assignments and at least two USDOJ contracts, whose total value exceeded \$600,000.

CSO/SSO Background

9. In general, there are two types of wastewater collection systems: combined sewer systems and separate sanitary sewer systems. Combined sewer systems collect both sanitary sewage and storm water in a single system of pipes. Combined sewer systems are really an artifact of a now outdated way of managing sewage. For centuries, both sewage and storm water were simply collected in pipes that discharged untreated to receiving waters. Because both types of flow were simply being routed to the river, it often made economic and engineering sense to build one set of sewers to handle both types of flow. As development increased the size and number of cities and towns, raw discharge of sewage became a health and aesthetic problem. Treatment of sewage was the answer, but in combined systems the large flows that occurred during rain fall events were greater than the treatment system could handle. An elegant (for its time) answer was to use diversion devices, called regulators, to direct dry weather flow to new sewers, called interceptors, that carried the dry weather sewage to the new treatment works.

During wet weather high flow conditions, a large portion of the flow was allowed to discharge directly to the receiving waters from engineered release points, known as Combined Sewer Overflows (“CSOs”), throughout the combined system. This approach to wastewater management was a great improvement over the prior practice of raw discharge of all sewage; however it resulted in over 900 combined collection systems in the United States. In an effort to bring these hundreds of systems into compliance with the Clean Water Act, the USEPA issued its CSO Control Policy in 1994.

10. In separate sewer systems, sanitary sewage is collected in one set of pipes, and storm water is collected in another. By design, only sanitary sewage is conveyed to the wastewater treatment plant, regardless of the weather. If properly designed, constructed and maintained, separate sewer systems should generally be unaffected by all but the most extreme weather events.
11. Chronic or frequent SSOs are caused by two problems: 1) lack of system capacity and/or 2) inadequate collection system operation and maintenance. Lack of system capacity results from either failure to expand the collection system to accommodate increased wastewater flows (due to growth in population and industry) or from excess “clear water” or “Infiltration /Inflow” (“I/I”) entering the system during and following wet weather. “Infiltration” is water entering a sewer system from the ground through defects in deteriorated underground pipes and manhole walls. “Inflow” is surface water (such as rain water and runoff) that is discharged into the sewer system from sources such as roof leaders, yard drains, and manhole covers. Excessive I/I results from improper construction, inadequate maintenance (as discussed below), or a sewer that, because of age, is “worn out.” In many systems, capacity-related SSOs are the result of a combination of failure to expand to accommodate growth and excessive I/I.
12. The second primary cause of SSOs is blockage or collapse of sewers due to inadequate maintenance of the sewer system. For example, pipes deteriorate over time; tree roots grow into pipes; and grease from restaurants can cause blockages. These conditions can result in total or partial blockages of sewer lines, causing sanitary sewers that otherwise have sufficient capacity, to overflow. Even in a well maintained and appropriately sized system, SSOs may still occur, although at a low frequency. In a well maintained and appropriately sized system SSOs will not be chronic; those that occur may be caused by extreme weather conditions (e.g., serious floods), vandalism, occasional blockages, or unintentional damage by other parties (e.g., a line being ruptured by a contractor).

Defendants’ System

13. Like many large wastewater collection and treatment systems, the one operated by Hamilton County includes both separate and combined sewer areas. Hamilton County’s system is approximately 55% combined and 45% separate. As in many such systems, the combined areas are concentrated in the older, central portion of the County’s system (which includes downtown Cincinnati), with separate sanitary sewers having been added

to support later growth in the outlying areas.

14. Hamilton County operates a very large and complex system that serves approximately 800,000 people in an overall service area that covers more than 400 square miles. These residents are located in 33 different municipalities, as well as unincorporated areas of the County.
15. Hamilton County's sewer system includes about 3,000 miles (about 16 million feet) of sewer pipe. Eight major pump stations and many smaller pump stations help transport the collected wastewater and storm water to seven large treatment plants (Mill Creek, Muddy Creek, Little Miami, Polk Run, Taylor Creek, Sycamore, and Indian Creek), and a number of smaller treatment plants. In the combined portion of the system, there are 233 permitted CSOs. These CSO points allow the release of peak wet weather flows that are larger than the collection and treatment system can process; total volume discharged in a typical year is over 6 billion gallons.
16. Hamilton County's separate sewer system is also significantly affected by rainfall, and has approximately 100 separate sewer overflow points (the "enumerated SSOs" and the "possible SSO locations") to relieve high wet weather flows. The "enumerated SSOs" are similar to CSOs in operation. These "enumerated SSOs" were constructed many years ago, and are the result of a no-longer acceptable approach to dealing with overloaded separate sewer systems. Current "enumerated SSO" volumes in a typical year are generally an order of magnitude smaller in average annual volume compared to Defendants' CSOs. When wet weather results in increased flow in the separate system beyond that which the system is capable of carrying, these points allow release of the excess flow to the river. Unlike CSOs, these points are not permitted, and are therefore considered to be illegal.

SSO CIPs

17. The development of projects to address the most active constructed or "enumerated" SSOs was originally embodied in a draft OEPA Director's Final Findings and Orders ("DFFO"), which was the subject of negotiations between Defendants and OEPA prior to the point in time at which USEPA and USDOJ entered into negotiations with Defendants. These projects involve the elimination of various inflow sources (such as storm inlets) and the construction of replacement and relief sewers that together will address capacity limitations that are the underlying causes of these most active SSOs. It is my understanding that OEPA expects these projects to eliminate all overflows, if possible, and to meet a minimum design criterion of no overflows in 10 year/24 hour rainfall events. It is also my understanding that Defendants have understood the aforementioned minimum performance criteria to be required for each of the projects proposed to address the most active SSOs, and that those projects have been developed so as to achieve that level of performance.

18. It is my understanding that the Sierra Club has submitted comments to USEPA regarding the proposed consent decrees, and that two declarations by Dr. Bruce Bell were appended to those comments. In his second declaration's Paragraph 9, Dr. Bell questions whether the projects identified in IPCD Exhibit 3 will eliminate all "highly active" SSOs.
19. It is my understanding that Defendants and OEPA agreed in the early 1990s that Defendants should first focus their SSO elimination efforts on a particular set of SSOs that were labeled "highly active." It is my understanding that Defendants and OEPA utilized available rainfall and sewer system performance data to decide which SSOs to include in this set. Once this set of SSOs was identified, Defendants then concentrated their efforts on investigating the causes of those SSOs, and identifying and implementing appropriate measures to address those SSOs.
20. Although conditions may have changed since the "highly active" list was established, and other SSOs might now be included if a new "highly active" list was to be developed (it should be noted that Dr. Bell provides no details in support of his assertion that other SSOs belong on any revised "highly active" list), requiring completion of the Exhibit 3 "CIP" projects as soon as possible still makes sense because Defendants have already completed much if not all of the investigation, engineering and planning for these projects, and the projects have already been included in Defendants' Capital Improvement budgets.
21. The Capacity Assurance Program will address all remaining capacity-related SSOs, including any new "highly active" SSOs and capacity-related basement backups, and will include a schedule "that is as expeditious as practicable" for the elimination of these SSOs.
22. In his second declaration's Paragraph 7, Dr. Bell states, concerning the CIPs, that the IPCD "*does not require that the [CIPs] be completed on the scheduled date, if ever.*" That statement is incorrect. Paragraph VI.A.1 of the IPCD requires Defendants to "construct Capital Improvement Projects (CIP) consistent with the descriptions set forth in Exhibit 3 and in accordance with the Construction Completion dates for each project set forth in Exhibit 3." Furthermore, Paragraph X.C.2 of the IPCD provides for substantial stipulated penalties if Defendants fail to meet any of the Construction Completion dates.
23. Dr. Bell also states that the "*IPCD allows Defendants to modify any of these projects based upon modeling results along with the schedule for that project.*" That statement is not correct, in that it implies that Defendants can unilaterally choose to modify project scopes and/or dates. In fact, Paragraph V.A.1 of the IPCD only allows Defendants to modify projects and/or schedules with Plaintiffs' approval, or by order of the Court as a result of dispute resolution. Furthermore, Paragraph V.A.1 specifically states that such modification shall only be "to address deficiencies in those projects identified by the Sanitary Sewer System Hydraulic Model," and any alternative schedule proposed must

be “as expeditious as practicable.”

24. Given the requirements of Paragraph V.A.1 of the IPCD described above, I disagree with Dr. Bell’s assertion that there is any incentive or opportunity for Defendants to *“continually push the required completion date into the future.”* In my opinion, the IPCD simply ensures that deficiencies identified in the course of detailed project design are addressed in a technically appropriate and expeditious manner.

SSO 700 Interim Remedy

25. SSO 700 appears to currently be Defendants’ most significant SSO. Defendants have estimated, based upon initial computer modeling of that portion of Defendants’ collection system, that SSO 700’s average annual overflow volume is approximately 75 million gallons per year, and that it overflows approximately 44 times per year.
26. As part of the negotiation of the Interim Partial Decree, a two phased approach to addressing SSO 700 was agreed upon. The first step in addressing SSO 700 involves Defendants spending a minimum of \$10 to \$15 million to construct an interim treatment facility, known as the Chemically Enhanced High Rate Settling and Storage Facility (CEHRS” or “SSO 700 Interim Facility”). This interim treatment facility will utilize a relatively new (in the U.S.) wet weather treatment technology known as ballasted flocculation, in conjunction with disinfection facilities and a storage basin, to treat and discharge, or store and pump back to Defendants’ Mill Creek wastewater treatment plant, most of the discharges occurring from SSO 700 in a typical year.
27. Ballasted flocculation has been more widely utilized in Europe than the United States, and it appears to be a very promising wet weather treatment technology. Ballasted flocculation uses a combination of chemical addition and a recycled ballast material (fine sand or densified sludge) to achieve both very high pollutant removal levels and very compact treatment units. Available literature suggests Biochemical Oxygen Demand (“BOD”) and Total Suspended Solids (“TSS”) removal rates of over 65% and 90% respectively (compared to the removal rates of 85% for both BOD and TSS required by the Secondary Treatment Regulations at 40 CFR Part 133), are possible.
28. This performance is expected to allow for very effective disinfection (similar to that achieved in secondary treatment plants) and very significant reduction of the pollutant load currently being discharged by SSO 700 to the Mill Creek. Ballasted flocculation is a very efficient form of chemically-enhanced clarification. As such, ballasted flocculation provides meaningful (approximately 90%) reduction in bacteria levels even prior to disinfection, as compared to very little reduction in bacteria levels by simple clarification. It also provides very low effluent suspended solids levels, as compared to the much higher suspended solids levels typically produced by simple clarification, which in turn allows for more effective disinfection. It should be noted that the numerous High Rate Treatment (“HRT”) systems included in Defendants’ 1996 CSO Long Term Control Plan

were simple, highly loaded clarification systems. Such systems would provide for significantly poorer disinfection performance than a ballasted flocculation system.

29. These characteristics make this technology particularly applicable to the treatment of wet weather flows. USEPA is very interested in this technology, and part of Defendants' operation of this system on an interim basis will be to carry out a study of its performance and operating characteristics. The results of this and similar studies will play an important role in helping to better define the applicability of this technology to wet weather treatment needs throughout the country.
30. The Interim Partial Consent Decree requires that within 11 months of lodging (by January 15, 2003) Defendants must submit an SSO 700 Interim Remedial Measures Plan. The Decree also requires that the Plan must include a schedule that is "as expeditious as practicable," and that under all circumstances achieves completion of construction by no later than December 31, 2007. Several of the schedules required by the decree use this approach of establishing a "backstop date" for the completion of various measures under the decree; however, of greater importance is the requirement that the schedules be "as expeditious as practicable." These plans and schedules are subject to USEPA and OEPA review and approval.
31. Defendants submitted the SSO 700 Interim Remedial Measures Plan on January 13, 2003. As first submitted, that Plan included a completion date of December 2007 for the SSO 700 Interim Facility. I assisted USEPA and OEPA in the review of that Plan. In addition to raising several technical issues, that review also found that the proposed schedule was not "as expeditious as possible." As a result, that Plan was modified by Defendants and resubmitted to USEPA. The revised plan was approved by USEPA and OEPA on April 14, 2003; the approved plan includes a date of substantial completion of July 2006. That revised schedule does provide for an additional 6 months contingency time; however, that additional time can only be applied in specified circumstances involving "unavoidable contingencies," such as "unavoidable events" that cause delays in site acquisition or obtaining necessary legislation. Defendants' analyses indicated that the SSO 700 Interim Facility proposed in their approved Plan would provide sufficient capacity to allow no overflows in a typical year, at an estimated capital cost of \$11.3 million.
32. Defendants have since proposed, in an addendum to the SSO 700 IRM Plan recently approved by the regulatory agencies, to significantly increase the storage capacity of the SSO 700 Interim Facility (from 1 million gallons to 3.6 million gallons) and the total project cost to \$15.6 million. Defendants have proposed this capacity increase, so as to further improve the Interim Facility's performance. The approved Plan Addendum specifically states that "the project has been designed and planned to handle a ten year design storm event." This substantial increase in system capacity will result in the SSO 700 IRM almost completely eliminating this SSO's environmental impacts. Untreated discharges will drop from over 40 per year to perhaps one every several years.

33. In his second declaration's Paragraph 36, Dr. Bell criticizes the interim remedy for SSO 700 because it will continue to result in discharges "that could not be permitted under USEPA and OEPA regulations."
34. Dr. Bell is failing to acknowledge that in the case of municipal wastewater collection systems, the need for continued operation of those systems means that violations will continue to occur while remedial measures are implemented. As a result, collection system consent decrees include schedules for compliance, and thus acknowledge that violations will continue until needed measures are implemented.
35. One example of a major enforcement initiative that recognized noncompliance during the implementation of measures to ultimately achieve compliance was the National Municipal Policy ("NMP"). This policy was first adopted in 1979 and reaffirmed in 1984. The Policy was an effort to secure compliance by all municipal sewage treatment plants with the secondary treatment standards; in 1984 over 1500 major treatment plants were still in noncompliance. The NMP required compliance with the standards by July 1988; facilities failing to meet that deadline were placed under judicial orders that included compliance schedules. During those schedules, facilities were required to meet interim limitations that were not fully compliant with the CWA. A second and very current example of this reality is the current implementation of USEPA's 1994 CSO Policy. Under this policy, authorities with combined systems are entering into consent decrees with USEPA and the states that allow extended schedules for the construction of the control measures necessary to bring their combined sewer overflows into compliance with the CWA. Two recent examples are consent decrees entered into by Toledo, Ohio and Youngstown, Ohio. A third and very related example of this circumstance would arise if Dr. Bell's secondary plant was to be constructed. If Plaintiffs were to enter into an alternate consent decree with Defendants requiring the construction of such a treatment plant, provision would need to be made for the planning, design, permitting and construction of such a plant. During that time, the consent decree would in effect acknowledge that SSO 700 would continue to overflow in violation of the law.

SSO 700 Final Remedy

36. One option for addressing SSO 700 permanently would be to utilize a flood control/storage/conveyance tunnel currently being considered by both Defendants and the U.S. Army Corps of Engineers ("USACOE"). This deep (approximately 300 feet below ground surface) tunnel would be of relatively large diameter (30 feet or more), be approximately 16 to 18 miles long, and have a total volume of approximately 500 million gallons. Construction of such a tunnel is a challenging undertaking from both an engineering and a construction perspective. Large access pits and shafts are typically constructed to allow large, specialized tunneling machines to bore the actual tunnel through the rock. Successful construction of the tunnel may require dealing with unexpected and unfavorable rock conditions and unexpected water intrusion.

37. The Deep Tunnel would parallel the Mill Creek, with its downstream end being at the Ohio River. The tunnel would serve several purposes. During frequent, typical storm events this tunnel would be used to capture combined sewage flow downstream of SSO 700, thus freeing up sufficient interceptor capacity to allow all flows now discharged at SSO 700 to be conveyed to the Mill Creek Wastewater Treatment Plant. In addition, the aforementioned additional interceptor capacity will also likely play a role in addressing other Mill Creek area SSOs. During these frequent, typical storm events, a control structure at the downstream end of the tunnel would remain closed, and following the rainfall event, pumps would lift the combined sewage and storm water collected in the tunnel to the surface for treatment at the Mill Creek Plant prior to discharge. During very large, infrequent storm events, the tunnel's downstream control structure would be opened and the tunnel would serve as additional flood water conveyance for the Mill Creek drainage basin. In my opinion, the Deep Tunnel would allow Defendants to avoid all discharges in a typical year from a substantial number of their 233 CSOs.
38. Currently available information from the USACOE suggests that the cost for the tunnel itself would be approximately \$880 million. Defendants initial estimates of the cost of the construction necessary to connect Defendant's CSOs to the tunnel are about \$200 million, for a total project cost of over \$1 billion. As the tunnel is being considered by the USACOE for flood control, it is my understanding that a portion of the cost of the tunnel itself will be born by the USACOE. USACOE staff have indicated that recent joint projects have required a community to pay roughly 35% of the cost of flood control projects it builds. Thus, a rough estimate is that the tunnel and related sewer connections will cost Defendants about \$508 million (the costs of the sewer projects plus 35% of the tunnel costs). However, it is too early to determine either the cost of the tunnel and the related projects, or Defendants' share with any real accuracy. In addition, the cost of the tunnel and related construction will be only a portion of Defendants' ultimate expenditures on CSO control.
39. The USACOE is currently in the process of reviewing a range of options for addressing flooding on the Mill Creek. As a result of that review, the USACOE has issued a draft report entitled "Mill Creek, Ohio Flood Control Project, A Briefing Document for the General Re-evaluation Report, Report on the Initial Screening of Alternatives," dated March 2003. That report did not find the Deep Tunnel to be the most cost effective solution to local flooding, but it carried the Deep Tunnel forward for further evaluation. The Deep Tunnel was carried forward because it is viewed by the USACOE as the most locally favored means of addressing severe flooding problems in the Mill Creek drainage basin, and because the USACOE anticipated that additional information regarding environmental benefits of the Deep Tunnel may favorably change its cost-benefit performance relative to other options being carried forward.
40. I have also recently communicated by voice mail messages with Mr. Barry Schueler of the USACOE. In his recent message to me, he indicated that the USACOE is currently

considering only three alternatives, and that the Deep Tunnel is one of those three alternatives. Furthermore, he indicated that the USACOE is currently planning on a March 2005 release date for the General Reevaluation Report. Implementation of the Deep Tunnel, particularly in light of possible USACOE cost participation, is expected to be a very cost effective means for Defendants to address both SSO 700 and its Mill Creek CSOs. Further, if the Deep Tunnel is implemented, Defendants should be capable of implementing a higher overall level of CSO control than might be possible if the Deep Tunnel were not implemented.

41. It is my understanding that Sierra Club has characterized the Deep Tunnel as providing “merely” a two-year storm level of control for CSOs and SSOs. I believe this characterization is both inaccurate and demonstrates a lack of understanding of the realities of CSO control.
42. As noted above, it is my understanding that Defendants do not intend SSO flows to be directed to the tunnel; instead, the directing of combined flows to the Tunnel will provide a sufficient increase in downstream capacity to allow flow that was discharged via SSOs to be directed downstream to treatment. Thus, CSO and SSO level of control will not be directly related.
43. Based on my significant experience with CSO control programs throughout the U.S., the level of CSO control expected to be provided by the Deep Tunnel is quite high, compared to what has and is projected to be achieved by other cities’ LTCPs. Sierra Club seems to believe that elimination of 100% of CSOs is readily achievable; for most systems 100% elimination is only achievable by extremely costly system wide separation.
44. It is my understanding that Sierra Club has stated that, as a flood control project, the tunnel should not be “counted” as part of the \$1.5 billion dollar amount that may serve as a basis for Defendants’ proposing a schedule that, while still as “expeditious as practicable,” extends past calendar year 2022. In my opinion, the Tunnel would be a multi-use project, which MSD and the City would only be partially paying for. If the CSO control benefit provided by the Tunnel is equal to or greater than that which Defendants could achieve by spending a similar amount on other measures to control those same CSOs, it would seem appropriate to allow the local cost of the tunnel to “count.”
45. The Interim Partial Consent Decree requires that Defendants submit to USEPA and OEPA a notice regarding their intent to utilize a Deep Tunnel to permanently address SSO 700 “as soon as sufficient information becomes available,” but no later than December 31, 2005. The USACOE is currently planning on a March 2005 release date for the General Reevaluation Report. Therefore, December 2005 is an appropriate “backstop” date. The requirement for notice “as soon as sufficient information becomes available” will result in notice occurring as soon as possible.

46. The Interim Partial Decree also requires completion of all SSO 700 permanent remedial measures no later than either December 31, 2016 or December 31, 2022, depending on whether a Deep Tunnel is to be utilized, or another approach is selected. In either case, the Decree also requires a schedule for completion that is “as expeditious as practicable.” Given the magnitude of the Deep Tunnel project, the engineering uncertainties associated with any large tunneling project, possible impacts of USACOE involvement, the USACOE’s current estimates of likely planning/design/construction schedules, and USEPA’s and OEPA’s ability to require Defendants to complete work “as expeditiously as practicable,” December 2016 is an appropriate “backstop” date for the tunnel option. Should the tunnel not be constructed, and given the extremely high level of control of SSO 700 discharges that will result from the implementation of the interim treatment facility, USEPA’s and OEPA’s ability to require Defendants to complete work “as expeditiously as practicable,” December 31, 2022 is an appropriate “backstop” date that is generally in line with the February 2022 completion date required by the consent decrees for all other measures. Selection of a “tighter” backstop date might have limited USEPA’s and OEPA’s ability to allow Defendants desirable flexibility in what will be concurrent efforts to eliminate SSOs and to bring their CSOs into compliance with the Clean Water Act.
47. It is my understanding that the Sierra Club has suggested that one solution to the SSO 700 overflows might be to build a secondary treatment plant near SSO 700 to provide additional capacity in the interceptor. In my opinion, this type of facility may not be feasible, for reasons discussed below. Even if feasible, a secondary treatment plant is not preferable to the two-phased approach in the decree of the interim treatment facility followed by the tunnel or other appropriate remedy to eliminate unpermitted discharges from SSO 700.
48. Successful construction of the secondary plant would require a larger site than the proposed interim plant, due to the very compact nature of the ballasted flocculation technology proposed for the interim facility. Defendants have indicated that they have identified an appropriate site for the currently proposed interim plant, have successfully negotiated acquisition of the site with the owner, and anticipate entry into a contract “any day.” I have seen no information indicating that a site sufficient for a full secondary treatment plant is available. In addition, the siting of a larger, permanent secondary treatment plant may encounter greater local opposition than a smaller, interim facility.
49. Unlike an interim plant, which may be allowed under a consent decree, a permanent treatment plant discharging into the Mill Creek will need to be permitted under Ohio’s rules and regulations. Ohio’s rules and regulations may make the permitting of a continuous discharge on the Mill Creek challenging, and may require a higher level of treatment than secondary. If advanced wastewater treatment is required for any permanent wastewater treatment plant discharging to the Mill Creek, I would expect the cost of such a plant to be substantially higher than that of a comparably sized secondary treatment plant.

50. Even if it were possible to construct a secondary treatment plant at the site, the successful design and operation of a secondary treatment plant intended to address SSO 700 is likely to prove difficult. Secondary treatment is often negatively impacted by intermittent high wet weather flows; such flows will be experienced by any treatment system intended to eliminate SSO 700. In addition, secondary treatment would be much more expensive than the interim remedy required by the decree. Defendants' June 1993 "General Compliance Plan to Eliminate SSOs" indicates that during larger wet weather events, the downstream combined sewer system's ability to accept flow from SSO 700 may drop to very low rates, thus requiring a large peak flow capacity in any treatment facility intended to "completely eliminate" SSO 700 before CSO controls are implemented. Depending on the peak flow capacity required, an "SSO 700" secondary treatment plant may cost as much as \$60 million or more. For example, as part of its draft LTCP, the City of Indianapolis recently estimated the cost of a 15 MGD treatment plant intended to relieve loadings to an interceptor along a small river at \$60 million capital cost. The secondary treatment plant required to address the SSO 700 situation would likely be at least as large as the treatment plant considered by the City of Indianapolis.
51. The above estimates for the cost of a secondary treatment plant at SSO 700 are significantly greater than the cost of the currently contemplated interim treatment system (\$15.3 million). Operation and maintenance ("O&M") costs for the secondary plant will be appreciably higher than for the currently proposed interim plant because the secondary plant would operate 24 hours per day, 365 days per year, while the interim plant will operate only during wet weather, and would not need to be continuously staffed. Additional resources applied to addressing SSO 700 may ultimately come at the expense of additional CSO control within Defendants' combined system.
52. In paragraph 22 of his first declaration, Dr. Bell suggested that a full secondary plant could be put into service within five years. It is my belief that while technologically possible, this is very unlikely given probable OEPA permitting issues, possible siting issues, Defendants' contracting procedures and rules, and other hurdles that must be overcome to design, permit and construct such a plant.
53. In his second declaration's Paragraphs 31 - 34, Dr. Bell again states that a secondary treatment plant should be built to permanently address SSO 700. I believe that construction of such an expensive permanent facility is unwarranted, given the potential for a Mill Creek Tunnel to eliminate the need for any permanent facility at SSO 700. Instead, I believe that the construction of a much lower cost, temporary facility will achieve a substantial benefit in the short-term, and will allow application of the conserved resources to other collection system issues facing Hamilton County.
54. In his second declaration's Paragraph 31, Dr. Bell states that I have speculated in raising the possibility that there may be opposition to the siting of a secondary treatment plant at SSO 700, and that more stringent limitations than secondary may be required for a

permanent discharge at the SSO 700 site.

55. Opposition to a wastewater treatment facility is a very real possibility at almost any site; including the CEHRS facility. That facility will, however, have several significant advantages that I would expect to minimize opposition. First is its size; the CEHRS will occupy a site that is a small fraction of the size required for Dr. Bell's secondary treatment plant. Secondly, the CEHRS is intended to be an interim facility, whereas a secondary treatment facility would only make sense if intended to be a permanent facility. Thirdly, the CEHRS will only be operated during wet weather events, while a secondary treatment plant would operate continuously. My opinion that limits more stringent than secondary might be required by OEPA was based not on speculation, but rather on conversations with OEPA personnel, and the recognition that the discharge would occur to a relatively small, nutrient-impacted water body, thereby potentially necessitating a higher level of treatment to meet water quality standards.

Sanitary Sewer Capacity Assessment Program

56. In his second declaration's Paragraph 8, Dr. Bell states that the *"IPCD requires construction that will result in the elimination of only 16 (or 17 if SSO 700 is included) out of the 101 reported capacity related SSOs in the next 16 to 22 years. The 101 numbered SSO locations that are reported to Ohio EPA do not represent the total number of SSOs in the system. There are thousands of occurrences of sewage backing up into basements each year, and an additional number of SSOs, such as overflowing manholes, that occur at locations other than the numbered SSO locations reported to Ohio EPA by Defendants."* In his second declaration's Paragraphs 22, and 26, Dr. Bell again states that the IPCD fails to address these issues.
57. The IPCD, in addition to requiring the completion of specific projects to address the aforementioned 17 SSOs, also requires the completion of the Capacity Assurance Program Plan. The Capacity Assurance Program Plan must, according to the IPCD "identify additional feasible remedial measures that have the goal of eliminating all capacity-related SSOs." This plan will address overflows from any other locations or structures not otherwise specifically called out in the decree language, including those from pump stations. Pump stations pump sewage in the pipes uphill (or against gravity) and thus are part of the "transmission system" and are included within the decree's definition of the Sanitary Sewer System. The definition of SSOs in Section V of the IPCD also includes basement backups, unless those backups "are caused by blockages, flow conditions or malfunctions in a building lateral, other piping or conveyance system that is not owned or operationally controlled by Defendants." The Capacity Assurance Plan must also provide a schedule for the completion of all identified projects that is as expeditious as practicable. This Plan, once approved, must be implemented under the CSO decree.

O&M Plans and Other Attached Plans

58. The Interim Decree provides for the implementation of a number of plans that are appended to the decree. These include: the “SSO Monitoring and Reporting Plan” (Exhibit 5), the Sewer Overflow Response Plan” (Exhibit 6), the “Operation and Maintenance Program” (Exhibit 7), the “Industrial Waste SSO/CSO Discharge Management and Minimization Plan” (Exhibit 8), and “Pump Station Operation and Maintenance Procedures” (Exhibit 9).
59. The CSO decree also provides for the implementation of a number of plans. These are: the “Public Participation Plan” (Exhibit 2), the “Monitoring and Modeling Work Plan” (Exhibit 3), the “Long Term Control Plan Update Work Plan” (Exhibit 4), the “CSO Public Notification Plan” (Exhibit 5), the “Water-In-Basement Prevention Program Plan” (Exhibit 6), the “Water-In-Basement Customer Service Plan” (Exhibit 7), the “Water-In-Basement Claims Process Plan” (Exhibit 8), and the “Supplemental Environmental Projects Plan” (Exhibit 9).
60. These plans are an important component of the two decrees. The IPCD Plans together establish a high standard of operation and maintenance for Defendants to implement throughout the pendency of the consent decrees. For example, IPCD Exhibit 7 describes Defendants’ Operation and Maintenance (O&M) Program, which uses a Geographic Information System (“GIS”) computerized mapping/data management system, state of the art sewer inspection equipment, laptop computers for field personnel, and other sophisticated tools and procedures designed to prevent, identify, and correct maintenance problems in the sanitary sewer collection system. The O&M Program commits Defendants to specific procedures to rapidly investigate and resolve sewer problems, a sewer cleaning and inspection program (including minimum feet of sewers to be cleaned and closed circuit TV inspected per year), and the utilization of a comprehensive and accurate data management system. The “Pump Station Operation and Maintenance Procedures” (IPCD Exhibit 9) commits Defendants to an extensive schedule of inspection and preventative maintenance activities at each pump station. Together, these plans provide for proper and appropriate O&M of Defendants’ separate sanitary sewer system, and thus, should greatly reduce the number of blockage-related, point failure-related and structural failure-related overflows from this system.
61. The “Public Participation Plan” (Exhibit 2), the “Monitoring and Modeling Work Plan” (Exhibit 3), and the “Long Term Control Plan Update Work Plan” (Exhibit 4) establish how Defendants will carry out work necessary to adequately update their LTCP. The “CSO Public Notification Plan” (Exhibit 5) describes how Defendants will notify users of the receiving waters of CSO activations. The “Water-In-Basement Prevention Program Plan” (Exhibit 6), the “Water-In-Basement Customer Service Plan” (Exhibit 7), and the “Water-In-Basement Claims Process Plan” (Exhibit 8) are discussed further below. Together they establish a comprehensive suite of short-term measures that Defendants will use to reduce WIB incidents and to address their impacts, until more global measures to eliminate WIBs are implemented under the CAPP and the LTCP. The “Supplemental Environmental Projects Plan” (Exhibit 9) describes projects that Defendants will

complete in lieu of a portion of the penalty.

62. In his second declaration's Paragraph 12, Dr. Bell states that the *"O&M program required by the Consent Decree is inadequate to address non-capacity related SSOs, in that it requires less frequent cleaning of sewers and root removal from sewers than performed by the average utility, and significantly less frequent cleaning and root removal than required by EPA in recent actions."* In his second declaration's Paragraph 13, Dr. Bell states that *"a comparison of the O&M plan (Attachment 7 to the IPCD) to O&M frequencies from a benchmarking study performed for USEPA clearly demonstrates the inadequacy of Defendants' O&M plan."*
63. Collection systems are complex and vary significantly one from another in many important aspects. For example, combined sewer systems, or the combined portions of systems that have both combined and separate sewers, often have very different maintenance and operational needs and characteristics.
64. I am not aware of any studies that have polled a substantial portion of the approximately 20,000 sewer systems in the United States, as would be necessary to establish with some accuracy what current actual "average" maintenance practices and frequencies are. In fact, the benchmarking study that Dr. Bell relies on, entitled "Optimization of Collection System Maintenance Frequencies and System Performance", by the firm of Black and Veatch, dated February 1999, notes:

"The authors of this project conducted an extensive literature search (see Appendix E, Literature Review) to obtain nationwide information on current trends in collection system maintenance planning. Very few publications were found that dealt with optimizing system maintenance and no publications were found that specifically addressed system maintenance frequency determination or system performance rating evaluation. The literature contained very few papers on the subject of collection system operation and maintenance. Most papers focused on engineering design or sanitary sewer evaluation studies."
65. That study was not intended to identify average national collection system maintenance activity frequencies. Instead, the project was intended to develop a site-specific approach to "benchmarking" that a given utility could use to identify maintenance activity frequencies and schedules that made the most economic sense for that specific utility. In carrying out that study, Black & Veatch sent out questionnaires to only about 100 of the approximately 20,000 collection systems in the United States and received responses from only 42 of those receiving questionnaires. Of the 42 completed questionnaires received, only 16 were from "large" utilities (those serving a population of over 500,000 people). Given the limited number of facilities from which data was obtained, I do not believe that the referenced study provides sufficient data to state what current collection system maintenance practices are on a national basis. By focusing on the averages of this limited sampling of the U.S. collection system, Dr. Bell obscures the wide range of

characteristics seen among collection systems. Furthermore, while Dr. Bell criticizes the O&M Plan's root control requirements, he fails to note that only 36 of the 42 agencies reported having any root removal program at all and that 12 utilities appear, based on the data presented, to have carried out no root removal in the years for which data was provided.

66. In his second declaration's Paragraph 14, Dr. Bell states that "*O&M requirements contained in the IPCD are inconsistent with and far more lenient than recent EPA actions in other cities with which I am familiar.*" Dr. Bell only cites one example of such a recent EPA enforcement action, that being a recent administrative order issued by USEPA to the City of San Diego, California. Dr. Bell also notes that San Diego was required to implement a grease control program.
67. I participated in an earlier enforcement action involving San Diego and was involved in the development of a consent decree between San Diego and USEPA. The City of San Diego's situation is significantly different than Hamilton County's. San Diego's SSO problem was caused by O&M practices and local conditions, not by lack of capacity. Grease blockages have been identified as a significant cause of SSOs in the San Diego system. Furthermore, San Diego is a completely separate sewer system. San Diego does not have a combined sewer system, and therefore does not have to develop or implement the major CSO control measures facing Defendants. In my opinion, the requirements USEPA imposed on San Diego in the recent order reflect the O&M-related nature of San Diego's SSOs.
68. In contrast to San Diego, Hamilton County's history of SSOs has primarily been the result of capacity limitations. Specifically, while O&M-related SSOs, including grease blockages, do sometimes occur in Hamilton County, Hamilton County has made significant improvements in its O&M programs over the last several years, and capacity limitations are Hamilton County's most significant problem. Hamilton County has a large combined sewer system, and substantial effort and expenditure will be required to bring those CSOs into compliance with the Clean Water Act. Consequently, this enforcement action and the IPCD have focused primarily on addressing capacity-related issues in Defendants' system.
69. In his second declaration's Paragraph 15, Dr. Bell states that "*the IPCD does not really require that Defendants perform the specified actions each year. Compliance is measured by averaging three years performance.*"
70. Collection system maintenance is generally a long term issue. If a utility's collection system maintenance activity levels fluctuate somewhat within a three year period, but overall remain adequate, I do not believe that is cause for concern.

Defendants' 1996 LTCP and Other CSO/SSO Studies

71. In 1991, Defendants completed a system-wide study known as the Stormwater and Wastewater Integrated Management ("SWIM") Plan. That plan proposed a wide range of CSO management measures. Hamilton County subsequently undertook a re-evaluation of CSO control in light of the then-recently released 1994 EPA CSO Control Policy. That effort resulted in a three phase Combined Sewer Overflow Strategy Development and Facilities Planning effort, and the release in March 1996 of a "Combined Sewer Overflow Control Plan; Muddy Creek, Duck Creek/East Little Miami, and Mill Creek Drainage Areas" ("1996 LTCP").
72. The 1996 LTCP represented significant effort on the part of Defendants to address CSOs. However, USEPA and OEPA concluded that this plan would not result in compliance with the Clean Water Act.
73. In particular, the proposed March 1996 LTCP would have resulted in an average annual combined sewer control rate of about 85%. In other words, in a typical year, about 15% of the total flow in the combined system during wet weather would be discharged untreated. Furthermore, much of the controlled CSO volume would have received the minimum level of treatment (simple clarification, and disinfection) allowed under USEPA's CSO Policy. According to the 1996 Plan, the untreated discharge would take place in about 12 overflow "events" each year (in each "event" anywhere from 1 to all remaining, active CSOs might overflow), and would involve a total of over 2.5 billion gallons of untreated combined sewer overflows per typical year.
74. Given the bacteria standards that apply to Defendants' receiving waters, it is virtually impossible to comply with those standards at an 85% CSO control level. Therefore, implementation of the 1996 Plan would result in an inadequate level of CSO control. In addition, that plan fails to fully consider the possible use of a Deep Tunnel for control of the Mill Creek CSOs, and is not based on the evaluation of all currently available technologies (such as the ballasted flocculation system being utilized as an interim control measure at SSO 700; described above) that would achieve significantly higher levels of pollutant removal than the CSO treatment facilities included in Defendants' 1996 LTCP.
75. In 2001, Defendants' consultant BBS carried out an evaluation of costs for SSO elimination, CSO control and water-in-basement project costs. This effort looked at two levels of control for each wet weather program. The BBS effort involved the use of planning-level (i.e., simplifying) assumptions applied across each entire program, and as such generated what I would consider to be "order of magnitude" planning level cost estimates. Total CSO/SSO/WIB costs were estimated by the BBS Report at \$1.25 billion to \$3.64 billion.

CSO Consent Decree

76. To address the above concerns and to require the implementation of measures necessary

to address all SSOs not eliminated pursuant to the IPCD, the USEPA, OEPA, and Defendants have negotiated and propose to enter into a second consent decree, the “Consent Decree on Combined Sewer Overflows, Wastewater Treatment Plants and Implementation of Capacity Assurance Program Plan for Sanitary Sewer Overflows” (the “CSO Decree”).

77. The CSO Decree requires Defendants to collect additional data and carry out additional alternative analyses, so as to develop a revised LTCP. The CSO Decree also requires Defendants to implement the SSO elimination measures identified in the Capacity Assurance Program Plan to be submitted concurrent with the revised LTCP (in June 2006).

CSO CIPs

78. Sierra Club has expressed concern regarding perceived delay in the implementation of CSO control measures that may result from the revision of the LTCP. In fact, the SSO Decree includes the aforementioned CIP projects to eliminate the “highly active” SSOs, and the CSO Decree includes a substantial number of “early action” CSO control capital projects (see Exhibit 1 attached to the CSO Decree) that EPA, OEPA and Defendants have agreed make sense to implement regardless of the outcome of the LTCP revision process. Defendants’ estimates indicate that together, these 13 SSO projects, 23 CSO control projects, and the upgrade of the Sycamore Wastewater Treatment Plant represent approximately \$130 million in capital expenditures over the next 6 years.
79. Sierra Club has suggested that additional specific CIP projects should have been included in the two proposed consent decrees. Presumably these would have been projects previously identified by Defendants, such as the various High Rate Treatment (“HRT”) systems proposed by MSD’s 1996 LTCP Report. Those HRT systems would not have resulted in elimination of CSOs or compliance with applicable existing Water Quality Standards. As noted above, those HRTs were sized to achieve only an 85% control level (much less than the level of control expected from the Deep Tunnel or the CEHRS facility, both of which Sierra Club found inadequate).
80. To assure that only appropriate projects were carried forward as “early action projects”, Defendants and the agencies undertook a detailed effort to identify appropriate control alternatives for each group or “cluster” of CSOs. Acting on behalf of USEPA and USDOJ, I was involved in that evaluation. The focus of this effort was to both define the scope of the additional alternatives evaluations Defendants would undertake as part of their update of the LTCP, and to specifically identify projects that would be compatible with all likely recommended CSO control strategies and levels of control. These latter measures are those that have been identified as “early action projects.”
81. In carrying out the review effort described above, we considered each combined sewershed separately. Each sewershed was further broken down into small groups, or

“clusters” of CSOs. These “clusters” each consisted of a relatively small number (1 to 10+) CSOs that are physically close together and/or hydraulically related.

82. In looking for “early action projects”, the primary criteria were that: 1) the project was likely to be selected regardless of approach to long term control, and therefore unlikely to be a “wrong” choice under any likely LTCP update, or 2) the project would not prevent further increase in control level if proven necessary by the LTCP Update.
83. The agencies and Defendants undertook a review of projects currently in Defendants’ CIP program. In this evaluation, each project was categorized as: A- good “early action” project; B- possible “early action” project, but needs further definition of scope of work; C- not a good “early action project”; and D) dependant on other entities for schedule and completion.
84. For each CSO, partial and total separation was first considered. While widespread use of separation to eliminate CSOs is likely to be very expensive, and can have negative impacts on water quality during small storms, for certain CSOs it can be a very cost-effective approach to CSO control. Types of CSO basins in which separation is very attractive include those having only a few, physically co-located sanitary sources, or those with a currently low enough activity level that separation of only street inlets is sufficient to allow elimination of the overflow. If a planned project, having another main objective such as eliminating local flooding, addressing a high water/dry weather (“HW/DW”) situation, or eliminating basement backups was expected to eliminate a CSO, that would also be considered an “early action project.” All CIPs falling into category “A” or “B” were considered.
85. Following the identification of “early action projects”, all remaining CSOs were then considered on both a “cluster” and individual level. All Mill Creek CSOs that would potentially be controlled by a Deep Tunnel project were identified, and the Deep Tunnel was identified as one of the alternatives to be carried forward for additional evaluation for those CSOs. Alternatives then considered were high rate treatment (“HRT”) and storage. The potential for consolidation of two or more CSOs within the cluster, as well with other clusters, was considered. The results of this effort are summarized in Exhibit 4 of the CSO Consent decree.
86. As Sierra Club had previously raised the issue of Defendants’ completing all CIP projects currently “on the books”, the agencies and Defendants met with Sierra Club face-to-face on May 1, 2003, to explain the process used to identify “early action” projects. In the May 1, 2003, meeting, the agencies presented information to Sierra Club about the projects on the Exhibit 1 list, including the process used to identify early action projects and why certain CIPs were selected.
87. Sierra Club continued to question why certain additional CIPs were not selected as early action projects, and provided a list of 57 CSOs not being addressed by “early action”

projects. At USEPA's request, I reviewed Sierra Club's list of 57 CSOs and the related CIPs, and prepared a table that summarized why those CIPs had not been selected as "early action" projects. This table was provided to Sierra Club, and discussed in a teleconference between Sierra Club and the regulatory agencies on July 21, 2003 that I also participated in. Most of the CIP projects proposed by Defendants' 1996 LTCP for the 57 CSOs were not selected as "early action" projects because most of those CSOs were either a) candidates for control by a Deep Tunnel, or b) proposed for control by a HRT system designed to achieve only 85% control. CSOs that could be controlled by a Deep Tunnel were viewed as poor candidates for "early action" projects because the Tunnel appears likely to provide a higher level of control at a lower cost. CIPs involving the HRTs proposed in the 1996 LTCP were rejected as "early action" projects because an 85% level of control, which equates to about 12 overflow events per typical year, will not result in compliance with the Clean Water Act.

88. As a result of the evaluation described above, I believe that an appropriate list of "early action" projects has been developed. I further believe that considering additional substantial projects as "early actions" would ultimately constrain the range of CSO control achieved by an updated LTCP, which would in turn result in reduced environmental benefits.

Monitoring and Modeling

89. It is my understanding that Sierra Club has expressed concern regarding the CSO Consent Decree's recognition that "sufficient rainfall" is necessary for Defendants to collect adequate additional monitoring data. I believe that such an acknowledgment is both realistic and technically appropriate. Further, I believe Sierra Club's implied concern that this recognition may be used by Defendants as a "loophole" to delay the LTCP update is unfounded.
90. Defendants are currently in the process of deploying equipment and manpower for sampling this spring. They have provided the agencies with a detailed Quality Assurance Project Plan ("QAPP") for this effort. On behalf of USEPA, I recently met with Defendants' technical staff regarding this plan, to provide comments on the sampling and monitoring to be carried out by Defendants.
91. During this meeting, Defendants' technical staff stated that it was their intent to complete all monitoring activities in this calendar year (2004) if adequate rainfall events occur. It is in Defendants' interest to complete this monitoring in as short a period of time as possible. Doing so will reduce Defendants' monitoring costs, and will allow Defendants to more easily meet the LTCP Update submission date in the CSO Consent Decree. Defendants have previously demonstrated their ability to complete field monitoring in a timely fashion, in completing the field monitoring associated with the now-calibrated System-wide Model, in spite of somewhat limited rainfall.

92. To support the anticipated LTCP Update, Defendants will require only a limited number (2 to 3) of appropriate storm events. In Defendants' aforementioned QAPP, target storm events are identified as having less than 0.1 inches of rain in the 72 hours prior to the event, and about 0.5 inches of rain in about 6 hours. Such events are not large or unusual, and generally occur a number of times in a typical year. It is therefore likely that the necessary number of needed rainfall events will occur in year 2004. As a result, it is entirely possible that monitoring in year 2005 may not be necessary. Furthermore, it is very unlikely that three such events would not occur in a two year period, and it is therefore likewise very unlikely that Defendants would need to request additional monitoring time due to insufficient rainfall.
93. Sierra Club has also questioned why additional monitoring is necessary, if the System-wide Model is adequately calibrated. The agencies agree that the System-wide Model is adequately calibrated. The data to be collected is not collection system flow data; instead, it is source and in-stream water quality data that is needed to support refinement of water quality models. Improved water quality models and source data are needed to support the re-evaluation of alternatives to identify CSO controls needed to meet Water Quality Standards.
94. Sierra Club has questioned the submission of a Post-Construction Monitoring Work Plan in year 2011, 5 years after the submission of the LTCP. Sierra Club's concern is apparently that Defendants' progress and performance will not be monitored until then. Nothing could be further from the truth. The consent decrees' reporting requirements compel Defendants to provide information regarding progress on all CIP projects and other remedial measures, as well as SSO, CSO and WIB events every quarter. This information will allow the agencies to carefully track Defendants' compliance with all milestone dates, and to be aware of then current CSO, SSO and WIB activity levels.
95. The Post-Construction Monitoring Program will largely focus on the issue of impacts on water quality. Until all measures impacting all the CSOs on a given water body are fully implemented, gauging of water quality compliance will be premature. This is particularly the case for systems such as Hamilton County's, where bacteria is the controlling pollutant of concern. In such circumstances, any substantial untreated discharge will likely result in noncompliance with existing water quality standards. Therefore, until all active CSOs on a given water body are controlled, the information provided by "not-yet-post-construction" monitoring would be of limited value.

Dry Weather Overflows

96. I understand that Sierra Club has questioned the adequacy of the CSO Decree's requirement that Defendants carry out a Dry Weather Overflow ("DWO") Study.
97. Hamilton County has for many years experienced significant DWOs that are the result of historical changes in the Ohio River water level. These water level changes have been the

result of dam construction and changes in the operation of existing dams. Defendants have implemented numerous construction projects to address these High Water/Dry Weather (“HW/DW”) overflows. As of June 2002, only 27 such points remained. All 27 were under study, design or construction at that time. Many will be eliminated by projects currently in Defendants’ CIP program, and the remainder will be eliminated by measures to be proposed as part of the LTCP. These overflows are Defendants’ most significant DWOs.

98. Other than HW/DWs, Defendants do not appear to have a significant DWO problem. Virtually all combined systems experience an occasional DWO. Likewise, even systems without significant DWO issues can usually improve their DWO performance. It is to achieve such a performance improvement that the DWO Study was included in the consent decree. As such, submittal of a study for the agencies’ approval was more than adequate.

WIB

99. Sierra Club has noted that sewage backups into basements (“Water In Basement” or “WIB”) are a significant issue in Defendants’ service area. WIB can result from inadequate capacity in the sewer system, or inadequate maintenance leading to sewer blockages. WIB can also result from blockages in, or the collapse of, the private sewer lateral. I agree that WIBs are a serious problem and I believe that, together, the two consent decrees will result in both short-term measures to reduce and mitigate WIBs, as well as a separate system capacity assurance program and a LTCP that together will assure adequate long term sewer capacities throughout Defendants’ system.
100. Short term WIB attenuation will be provided under the CSO Consent Decree by three related WIB programs that apply to all parts (both separate and combined) of Defendants’ system. These are the WIB Prevention Program, the WIB Customer Service Program, and the WIB Claims Program. These are presented in the CSO Consent Decree Exhibits 6, 7, and 8, respectively.
101. The WIB Prevention Program provides for the installation of backflow prevention devices or pumping systems on properties that have experienced WIBs as a result of inadequate capacity in Defendants’ sewers. These devices will prevent sewage from backing up into the affected properties. In addition, in certain cases, MSD may offer to purchase affected properties. The WIB Customer Service Program provides for rapid cleanup of customers’ homes following WIBs. The WIB Claims Program provides for compensation of customers’ material losses as a result of WIBs. All of these programs have been put into action as of January 1, 2004.
102. It is my understanding that Sierra Club has suggested that the consent decrees should include a specific financial commitment by Defendants. In my experience, USEPA and USDOJ do not include such provisions in Clean Water Act consent decrees.

103. In this case, identifying an appropriate cost for remedial measures now would nonetheless be impossible, as the appropriate suite of measures necessary to best address Defendants' various collection system issues have not yet been fully identified. This is why the decrees require Defendants to complete various studies and plans.
104. In the case of the Water-In-Basement Programs, I would expect Defendants to have difficulty in identifying an appropriate spending level to commit to, as these are entirely new programs for Defendants. As a result, it will take time and experience for Defendants to develop an understanding of the costs and time associated with addressing various types of WIB-impacted properties. Instead, in light of the appropriate concern by all parties regarding WIBs, Defendants have implemented the previously-described three programs. Given the substantial benefit likely to be realized in the short-term by these programs, I believe it is desirable for Defendants to implement them immediately, rather than carry out additional analyses and costing.
105. I have reviewed information provided by Defendants regarding WIB activities in the first quarter of this year. This information indicates that Defendants have aggressively implemented these programs. Defendants have reported first quarter expenditures of slightly over \$1 million. Defendants report that 109 properties are currently in the investigation/design phase of the WIB Prevention Program. Defendants also report that 90 claims have been received under the Claims Program, and that 63 of those claims have been validated and had checks issued to homeowners. Seven of those 90 claims were denied and 20 are still being reviewed.
106. It is my understanding that Sierra Club has questioned the Defendants' ability to investigate large numbers of WIBs during large rainfall events, and the target response times included in the WIB Programs. Sierra Club also has suggested that overall staffing levels for the program may not be sufficient. It is unrealistic and would be very expensive for Defendants to staff the WIB Programs 24 hours a day, seven days a week, at a level sufficient to allow rapid response to 100% of all received complaints in any size storm. The target response times included in the WIB Program Plans, and Defendants' current staffing levels seem reasonable. Furthermore, demand for the three WIB programs will naturally diminish over time, as "problem" properties are addressed. Therefore, I expect that the need to visit very large numbers of WIB properties in an individual rainfall event will at worst be a short-lived issue. It is also my expectation that the WIB Claims and Customer Service Programs will effectively encourage Defendants to put preventative measures into properties as quickly as possible.

Schedules and Overall Approach of Decrees

107. It is my understanding that the Sierra Club has questioned the two consent decrees' overall schedule and use of a "phased" remedial measures program.

108. The schedules in the Interim Partial Consent Decree and CSO Consent Decree were negotiated with the understanding on USEPA's, USDOJ's and OEPA's parts that Defendants will be required to undertake extremely significant remedial measures to address all of their collection system noncompliance issues. Together, these measures are likely to cost well in excess of one billion dollars.
109. Sierra Club has stated that the CSO Consent Decree "misses the opportunity" to tie the LTCP Update to a "specific system capacity." Sierra Club appears to believe that the agencies should simply pick a CSO control level and impose that control level on the Defendants. That is both technically ill advised and inconsistent with USEPA's 1994 CSO Control Policy.
110. Both SSOs, and CSOs that fail to comply with the Clean Water Act are illegal, and must be addressed by Defendants. In a system such as Defendants' that includes both SSOs and CSOs, it is important that remedial measures be developed in a holistic fashion, and that all proposed solutions to SSOs and CSOs be functionally compatible with one another, and that the impacts of each be considered in the design and sizing of the other. For example, lack of consideration of downstream combined system capacities and characteristics may adversely impact the performance of certain SSO elimination measures.
111. The approach taken by USEPA, USDOJ and OEPA in the Interim and CSO Consent Decrees provides the flexibility necessary to allow for the development of effective solutions to both Defendants' CSOs and SSOs, while at the same time requiring Defendants to address all of their most active SSOs (including a high level of interim treatment at SSO 700) in a short time frame, to address SSO 700 permanently an appropriate timeframe, to develop and implement measures to address the remaining SSOs, and to implement a comprehensive program to address WIB issues in both the short- and long-term. It is my opinion that in certain cases increased environmental benefit, particularly in the near-term, may be achieved by not strictly requiring that the elimination of all SSOs be given priority over CSO control. In a system with both SSOs and CSOs, it may be desirable from an environmental benefit standpoint to implement certain CSO controls prior to the elimination of every SSO, in order to realize the maximum environmental benefit as soon as possible.
112. As part of its effort to approach the study of its collection system and the identification of remedial measures in as holistic a manner as possible, Defendants have completed the development of a highly detailed computer model of both its separate and combined sewer systems. Defendants have previously developed less sophisticated, less detailed computer models of their collection system, but this model will allow more accurate assessment of capacity issues in a much greater portion of both the separate and combined system than those models developed previously. This model is one of the largest and most detailed collection system models in the U.S. and as such is advancing the state of the art in collection system modeling. This model is an important part both of

Defendants' efforts to address SSOs and CSOs, and Defendants' long term operation and maintenance of their collection system. In my opinion this model will assist Defendants and the regulatory agencies greatly in both identifying deficiencies within their system and in identifying the most effective solutions to those problems.

113. In my opinion and experience, the use of phased programs to address problems in large collection systems is appropriate and advantageous, and has been incorporated into numerous consent decrees between USEPA and other municipalities and authorities.
114. The Water Environment Federation's Manual of Practice FD-17 "Prevention and Control of Sewer System Overflows" Second Ed. (1999) notes:
115. *"The complex nature of these stochastic sources (CSOs and SSOs) of pollution and their effects can lead to an iterative approach as more information is developed and the scope of the problem is better understood. In many cases, it will be advantageous to approach plan development in phases, with flexibility to alter course based on the findings of each phase as well as changed public perceptions and regulatory requirements. Each phase should confirm, broaden, or revise the initially set plan objectives so that subsequent phases are well grounded and directed".*
116. Given the complexity of a large collection system and the extremely large costs likely to be associated with measures to address serious problems in such a system, it is unwise to select remedial measures without sufficient study of the system and its problems, and it is in the regulatory agencies' best interest to be provided with thoughtfully developed plans for consideration, review and comment, prior to the construction of extremely expensive capital projects.
117. I personally worked on the Jefferson County, Alabama consent decree. That decree ultimately included a three phase approach to system study and rehabilitation. The Baltimore SSO case, on which I also worked, was recently resolved via the entry of a consent decree which included initial, priority projects and a phased approach to system evaluation and remediation. I did not work on the Atlanta consent decrees, however I have reviewed those decrees. The First Amended Atlanta Consent Decree, which deals with Atlanta's separate sewer system, provides for a three phase program to address system deficiencies. Like the Hamilton County Interim Partial Decree, the Atlanta decree provides for several ongoing projects, as well as a program of evaluation and subsequent rehabilitation.
118. The cases cited above demonstrate that the approach taken by USEPA, USDOJ and OEPA in resolving Hamilton County's SSO and CSO compliance issues is consistent with those taken by USEPA and USDOJ in dealing with other large collection systems. Furthermore, the application of a phased approach, which requires structured and documented studies of the collection system's problems and review by the agencies of proposed remedial measures prior to implementation, is appropriate and prudent.

119. It is my understanding that Sierra Club has questioned why the IPCD allows Defendants to address SSOs on a sewershed-by-sewershed basis, while the CSO decree requires one LTCP Update. That is an appropriate approach because the standard for SSO control is different than that required for CSOs. SSOs are required to be eliminated, while CSOs must only be controlled up to the point necessary to comply with water quality standards and the Clean Water Act. These different standards of control, along with the smaller magnitude of SSO flows to be controlled, makes consideration of SSO control on a sewershed-by-sewershed basis practical.
120. It is my understanding that Sierra Club believes that a comprehensive approach to SSO elimination is possible using currently available data and information, and that additional evaluations and analyses are unnecessary. I disagree.
121. Defendants have numerous capacity limitations throughout their separate sewer system that cause the existing capacity-related SSOs. It is also very likely that there are substantial additional capacity issues throughout Defendants' system that have not yet caused chronic, capacity-related SSOs, but that may do so in the future. Defendants' combined sewer system currently discharges approximately 6 billion gallons per year of untreated combined sewage from over 230 CSOs, and control of those CSOs will require the development and implementation of extensive CSO control measures. Effectively addressing the wide-spread capacity issues in Defendants' sewer system will require not only a thorough understanding of capacity and flows throughout the separate sewer system, but also integration of that knowledge with the long term control of CSOs. The separate system and combined system share the available capacity in both the central collection (the "interceptors") and treatment systems. To understand the performance of either system, one must consider the other as well.
122. As noted previously, Defendants have developed a much more powerful and detailed computer model of their entire sewer system. This model will allow Defendants to not only identify measures to eliminate their existing, capacity-related SSOs, but will also allow them to evaluate the capacity of a much greater portion of their entire sewer system. The IPCD requires Defendants to do just that, and then to put in place a comprehensive plan that will not only eliminate current SSOs, but also ensure adequate capacity throughout Defendants' separate system, under anticipated future conditions. The comprehensive model and Defendants' additional analyses will allow for the identification of measures for ensuring long-term adequate capacity throughout the system that are both effective and also most compatible with CSO long term control.
123. The cost of the full range of measures that will be needed to address existing SSOs, secure the capacity necessary to avoid future, capacity-related SSOs, and to bring Defendants' combined system into compliance with the Clean Water Act will likely exceed one billion dollars. In order to achieve the greatest possible environmental benefit, it is important that all measures implemented be complementary and work

together to achieve optimal system-wide performance. Given the very large costs expected to be involved, I believe that the comprehensive approach to collection system issues included in the IPCD and CSO Consent Decree is the most technically sound approach to ensuring that Defendants achieve long term compliance with the Clean Water Act.

124. I also understand that the Sierra Club has objected to the decree's use of "rolling deadlines" (i.e., a deadline that is measured from a prior deadline, as opposed to a fixed date) and having deadlines established by plans. The IPCD has only one rolling deadline, after which, dates are fixed in Defendants' approved plans. Specifically, the Capacity Assessment Plan was due 120 days from completion of model validation under the decree. The Capacity Assessment Plan was required by the IPCD to provide fixed dates that are "as expeditious as practicable" for completing the Capacity Assessment, submitting the Capacity Assessment Report, and for submitting the Capacity Assurance Program Plan (CAPP), which in turn will contain a fixed schedule that is "as expeditious as practicable" for all of the activities necessary to address all remaining SSOs. The IPCD also required Defendants to finish calibration and validation of the model by October 31, 2003, unless there was inadequate rain to do so, in which case defendants must notify plaintiffs of this fact and complete calibration as "expeditiously as practicable." Defendants have completed calibration of the System Wide Model, as certified to USEPA and OEPA on October 31, 2003.
125. Defendants submitted the Capacity Assessment Plan for EPA and OEPA review in February 2004. I assisted USEPA and OEPA in the review of that plan. The Capacity Assessment Plan, as first submitted, included a schedule for submission of the Draft Capacity Assurance Report that was not as "expeditious as possible." USEPA/OEPA discussed their findings with Defendants, and declined to approve that initial Plan. As a result of those discussions, Defendants submitted a revised Plan, that was approved by USEPA and OEPA on April 13, 2004. The approved Capacity Assessment Plan fixes the date for completion of the Capacity Assessment and submission of the Capacity Assessment Report as June 30, 2004, and for submission of the Draft Capacity Assurance Program Plan on June 30, 2006. This later date is a significant improvement compared to the originally proposed date for submission of the Draft CAPP of February 28, 2007. This approved schedule is "as expeditious as practicable" and it requires Defendants to complete their capacity assessment and assurance planning activities in parallel with its update of its Long Term Control Plan.
126. As the approval of the Capacity Assessment Plan fixes a schedule for the remainder of Defendants' SSO elimination efforts, I believe further concern regarding the IPCD's one "rolling deadline" is unwarranted.
127. Sierra Club has stated that under the IPCD, Defendants can "simply set 2022 as the end date for all work." That is not correct. Defendants must propose a schedule in the CAPP that is "as expeditious as possible." That schedule, like the rest of the CAPP, is subject to

review and approval by the agencies. Should the Defendants refuse to adequately address a comment by the agencies regarding schedule, the agencies will have access to the Court via the dispute resolution provisions of the consent decree. The recent review and revision of the CAP and the SSO 700 Interim Control Plan suggest that “expeditious” schedules can and will be secured without resorting to dispute resolution.

128. Sierra Club’s statement that Defendants can “simply set 2022 as the end date for all work” is also not technically practicable. Given the large number of projects that will be needed to address all of Defendants’ collection system issues, spreading projects out over the course of the approved schedule will be to Defendants’ advantage from a project management standpoint.
129. It is my understanding that one comment received by USEPA to the proposed CSO Consent Decree suggested that complete elimination of all illegal overflows should be possible in less than five years and perhaps as little as one year. That is not true. The magnitude of Defendants’ collection system issues demands an adequately planned, holistic suite of remedial measures. In addition, even if Defendants had completed all planning and engineering for such a set of measures, completing them within five years would not be feasible.

STACP

130. It is my understanding that the Sierra Club opposes the inclusion of the Short-Term Adequate Capacity Plan (“STACP”) in the IPCD, on the grounds that it will delay or even prevent the elimination of the “enumerated SSOs” in Hamilton County’s separate sewer system. In brief, the STACP requires the Defendants to accumulate “credits” for projects that reduce wet weather flows, in order to receive approvals for new connections to the sewer system. The amount of “credits” required for a particular size new connection was developed by OEPA so as to assure that overflow volumes and frequencies would be reduced in areas where new connections were sought.
131. In Paragraph 16 of his second declaration, Dr. Bell states that “*the STACP is not designed to eliminate active SSOs*” and that “*the sole objective of the STACP plan is to maintain the existing conditions.*”
132. I disagree that the STACP will simply maintain existing conditions, and believe that Dr. Bell is ignoring the benefits of reduction of infiltration and inflow rates under the STACP. Capacity related SSOs occur when peak flow rates exceed local and downstream carrying capacity. By reducing the peak flow rates associated with storm events, it will take a larger storm event to activate a SSO that has had significant upstream wet weather sources reduced. Reducing the number of SSO activations is not “maintaining the existing conditions.”
133. In his second declaration’s Paragraph 17, Dr. Bell states that the STACP will “*extend the*

time that capacity related SSOs are active by continuing to allow additional flows to overloaded sewers without first determining the maximum carrying capacity of the sewer.” Dr. Bell also raises concerns that the 5 to 1 ratio between rainfall/infiltration removed and new development flow allowed will be offset by higher pollutant concentrations in overflows.

134. As discussed above, the STACP will result in earlier reduction in SSO activity by reducing peak wet weather flow rates before the system-wide capacity evaluation is completed. In a given storm event, if the reductions in wet weather flow have been sufficient to prevent activation of the SSO in question, then pollutant concentrations are irrelevant. Also, for larger storm events, the actual benefit is greater than a 5 to 1 reduction.
135. In his second declaration’s Paragraph 20, Dr. Bell states that sewer moratoriums (i.e., complete bans on new connections) are common. I have supported USEPA and USDOJ on numerous cases involving collection system cases. In my experience, complete sewer moratoriums are not common, particularly in the last 10 years. Collection system cases often involve lengthy compliance schedules; imposition of a complete moratorium would have a substantial impact on a community’s economy, and therefore its ability to implement necessary remedial measures. In the case of a utility facing hundreds of millions, if not billions, of dollars of collection system work over the near to mid-term, substantial rate increases are inevitable. Limiting growth and possibly negatively impacting the local economy might limit the utility’s ability to generate income needed to support this substantial amount of work, and could therefore actually interfere with the attainment of compliance with the Clean Water Act.

Oversight and Reporting

136. It is my understanding that Sierra Club has suggested that the proposed consent decrees are deficient in that they do not contain sufficient benchmarks of success, such as: SSOs eliminated each year, reductions in numbers of SSOs and CSOs, numbers of CIP projects completed, reductions in WWTP bypassing, reductions in WIBs, etc.
137. The reporting required under the proposed consent decrees will in fact capture a number of the more objective measures suggested by Sierra Club. These include enumerated SSO elimination project completion, CIP project progress and completion, and WIB program activities. In addition, the Defendants are required to report *any indication that an upcoming date may be missed, as soon as that possibility becomes apparent*. Such notice is actually more informative than simple reporting of missed deadlines as suggested by Sierra Club.
138. The Defendants will also continue to report CSO, SSO and WIB activations; thus changes in those events can be tracked by the agencies. It should be noted that CSO, SSO and WIB activity is to a significant degree driven by weather, and any attempt to use

activations as short-term measures of performance would require a more sophisticated analysis than suggested by Sierra Club. It is my opinion that while CSO, SSO and WIB statistics are meaningful measures in the long run, in the short-term more objective measures, like task completion, will better serve the agencies.

139. It is also my understanding that Sierra Club has questioned whether the agencies will adequately “police” the consent decrees once entered. To date, at USEPA’s specific direction, I have reviewed the Quarterly Reports, the SSO 700 Interim Remedial Measures Plan, and the Capacity Assessment Plan. These reviews have resulted in the clarification of several minor issues in the Quarterly Reports, better definition of the regulatory agencies’ expectations for monitoring under the consent decrees, and the revisions to the SSO 700 Interim Measures Plan and the Capacity Assessment Plan described previously. Likewise at USEPA’s direction, I have participated in various teleconferences and meetings with Defendants to resolve comments that have arisen as a result of the review of the referenced documents by myself and others.

Information Concerning Defendants’ Current Compliance Status

140. I have been told that the Sierra Club has criticized the U.S. for not providing Sierra Club with complete lists of all of the violations that the proposed consent decrees are intended to address. During my involvement in this case, the attorneys for the U.S. have requested that I begin to develop and/or update lists of potential violations, in anticipation of potential litigation. Ultimately, the attorneys for the U.S. never directed me to finalize these potential violation tables; however, I have studied Defendants’ system and evaluated potential violations in sufficient detail to assist USEPA and USDOJ in identifying appropriate remedial measures to include in the proposed consent decrees as injunctive relief. As part of the effort described above, I recently was asked to evaluate Defendants’ recent (2002 and 2003) potential violations. The following paragraphs present summaries of SSO and CSO occurrences, and bypasses and potential violations at Defendants’ wastewater treatment plants.
141. I have generated tables of positively identified and tentatively identified overflows from Defendants’ “enumerated SSOs” during calendar years 2002 and 2003. During calendar year 2002, Defendants reported a total of 790 tentatively identified and 143 positively identified individual overflows; during calendar year 2003, a total of 948 tentatively identified overflows and 76 positively identified overflows were reported. It should be noted that the data for calendar year 2002 did not include the first quarter (January through March). The information presented in the referenced tables was drawn from Defendants’ Quarterly Reports (as required by the IPCD) and tabulated by staff working under my direction. The government is providing these tables to all parties including Sierra Club, but has not attached them to this declaration in the interest of brevity, as they are approximately 100 pages in length.

142. I have also reviewed tables of reported overflows from Defendants' monitored, permitted CSOs during calendar years 2002 and 2003. These tables are from Defendants' 2002 and 2003 Annual CSO Reports. As Defendants are not required by their permit to monitor every CSO, these tables capture only a portion of the overflows that occurred during the referenced years. In year 2002, a total of 2,938 individual overflows occurred at the 71 of 233 CSO points monitored during that year. During 2003, a total of 3,058 individual overflows occurred at the 70 of 233 CSO points monitored during that year. The government is providing these tables to all parties, including Sierra Club, but has not attached them to this declaration in the interest of brevity, as they about two hundred pages in length.
143. I have also reviewed tables of bypasses at Defendants' wastewater treatment plants during 2002 and 2003. These tables show a total of 341 individual bypass events in years 2002 and 2003, at four of Defendants' wastewater treatment plants; the breakdown of bypasses among the four plants was: Mill Creek - 130; Muddy Creek - 207; Little Miami - 20; and Sycamore - 114. These tables were provided to me by Jim Simpson of Ohio EPA. It is my understanding that the information in these tables was generated by OEPA staff from OEPA's compliance database, which is based upon Defendants' self-monitoring reports. The government is providing reformatted versions (for clarity) of these tables to all parties, including Sierra Club, but has not attached them to this declaration in the interest of brevity.
144. I have also reviewed tables of permit effluent limit exceedances at Defendants' wastewater treatment plants during 2002 and 2003. These tables show totals of 39 permit limitation exceedances at the Mill Creek Plant, 1 permit limit exceedance at the Muddy Creek Plant, 2 permit limit exceedances at the Little Miami Plant, 9 permit limit exceedances at the Polk Run Plant, 34 permit limit exceedances at the Sycamore Plant, and 2 permit limit exceedances at the Indian Creek Plant. These tables were provided to me by Jim Simpson of Ohio EPA. As with the tables of bypasses described in the preceding paragraph, it is my understanding that the information in these tables was generated by OEPA staff from OEPA's compliance database, which is based upon Defendants' self-monitoring reports. The government is providing reformatted versions (for clarity) of these tables to all parties, including Sierra Club, but has not attached them to this declaration in the interest of brevity.
145. All of the potential violations listed above will be effectively addressed by the injunctive relief included in the two consent decrees.

WWTPs

146. It is my understanding that the Sierra Club believes that the two consent decrees do not provide sufficient measures to cure all recent WWTP compliance issues. It appears that much of Sierra Club's concerns may have been the result of a computerized list of

violations in years 2001 and 2002 provided by OEPA to Sierra Club during the discovery period that followed the entry of the IPCD. That list appeared to contain hundreds of individual violations. In reality, that list contained numerous errors, including repeat listings and supposed violations that were the result of search errors on the part of OEPA's data management system (for example, pH values above the lower limit, Dissolved Oxygen values above the minimum standard, etc) or reporting violations (i.e., data lost due to analytical errors). Defendants and Plaintiffs, both independently and together, reviewed the aforementioned violation list, and determined that it significantly overstated the number of Defendants' permit limit violations. In addition, both Defendants and Plaintiffs met with Sierra Club to explain these findings in detail. It is my understanding that these errors in OEPA's process for generating lists of Defendants' violations have been corrected; this has resulted in dramatically reduced lists of violations, as illustrated by the permit limit exceedance lists recently provided to me by OEPA described previously.

147. Based on my review of Defendants' potential wastewater treatment plant permit limit violations, it is my opinion that there are no significant issues at these plants that have not been appropriately addressed by the injunctive relief included in the proposed consent decrees.
148. In total there were only 13 minor potential violations at the Muddy Creek, Indian Creek, Little Miami, and Polk Run Plants in 2002 and 2003. These few isolated violations clearly indicate that these plants require no specific injunctive relief. There have been 6 relatively minor, potential one day pH limit violations at Polk Run; however these are most likely best addressed via Defendants' pretreatment program.
149. Together the Mill Creek and Sycamore Plants did experience a total of 69 potential permit limit violations in years 2002 and 2003; however, the nature of these potential violations is such that they will be addressed by Defendants' LTCP Update and Sycamore Plant Upgrade CIP, and no additional injunctive relief will be needed. Virtually all of these 69 potential violations appear to be related to peak flow impacts on the treatment plants. Both the Sycamore plant Upgrade and the Mill Creek CSO control measures to be proposed and implemented as part of the LTCP Update will reduce the impact of peak wet weather flows on these two plants.
150. Together these few potential violations represent a small fraction of the literally thousands of compliance monitoring data reported by Defendants for years 2002 and 2003 for these treatment plants.
151. It is my understanding that Sierra Club has questioned the Defendants' planned upgrade of the Sycamore WWTP. The Sycamore Plant is a 6 MGD design flow treatment plant serving a separate sewer area in Hamilton County. Current average flow to the plant is about 7 MGD. Even though this plant serves a separate sewer area, it is significantly impacted by peak wet weather flows. Peak wet weather flows to the plant of up to 47

MGD have been recorded, bypassing occurs at the Sycamore Plant, and surcharging occurs throughout the central Sycamore collection system.

152. Defendants have proposed to increase plant capacity to accommodate a peak flow rate of 50 MGD. Under Defendants' proposed plan, up to 18 MGD flow will pass through the same treatment as dry weather flow. Dry weather flow will pass through preliminary treatment, primary treatment, secondary treatment, filtration, and finally disinfection.
153. Under Defendants' proposed plan, flows above 18 MGD, up to 50 MGD total plant flow, will pass through preliminary treatment, and then be diverted to a new 32 MGD capacity high rate treatment unit. This high rate treatment unit will be of the same type (ballasted flocculation) as proposed for the Interim SSO 700 Treatment facility and described previously.
154. It is my understanding that Defendants have proposed the upgrade described above for at least two of the same reasons as were described for the SSO 700 facility. Treatment of a peak flow that is 700% of average flow by secondary treatment is technically very challenging. As discussed above, secondary treatment systems operate best when they receive relatively constant flow rates.
155. Defendants have evaluated historical flow records to the Sycamore Plant for years 1999 through 2002. During that period, flow only exceeded a rate of 18 MGD for a total of 1431 hours out of a possible 35,040 hours. That means on an annual average basis, a portion of the flow to the Sycamore Plant would not receive secondary treatment about 4% of the time. Under peak flow conditions, flow from the ballasted flocculation system would recombine with the flow from secondary treatment and the filters, and the combined flow would receive disinfection.
156. Defendants have estimated that the cost of the proposed upgrade to the Sycamore Plant will be about \$22 million dollars. The cost of providing full secondary treatment to a peak flow of 49 MGD would be significantly higher than the Defendants' estimated cost.
157. Defendants have indicated that they expect performance from this ballasted flocculation system that is similar to that expected for the CEHRS at SSO 700 (discussed above). I agree with those expectations.
158. It is my understanding that Sierra Club has questioned the adequacy of Defendants' wastewater treatment plant O&M practices. At USEPA's request, an SAIC environmental engineer with significant experience in wastewater treatment plant evaluations, Yvonne Ciccone, P.E., at my direction, carried out an evaluation of O&M practices and systems in use at Defendants' largest wastewater treatment facilities. In brief, her findings were that Defendants' wastewater treatment plant O&M management practices were adequate.

159. It is my understanding that Sierra Club has suggested that the Polk Run Plant's performance is negatively impacted by peak wet weather flows. This information appears to be outdated. OEPA staff have indicated that Polk Run is equipped with a storage basin to hold peak flows and return them to the plant for treatment. In addition, OEPA staff also stated that the Polk Run Plant is currently being expanded to a capacity of 8MGD, and that construction is now underway. Consequently, it does not appear that specific injunctive relief at the Polk Run Plant is needed.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this day, April 16, 2004

A handwritten signature in black ink, consisting of a stylized 'M' followed by a horizontal line.

Mark J. Klingenstein, P.E.

MARK J. KLINGENSTEIN, P.E.

EDUCATION

Drexel University, B.S., Civil Engineering (1979)

Stevens Technical Institute, M.E., Civil Engineering (Interdisciplinary/Environmental) (1989)

SUMMARY OF EXPERIENCE

Mr. Klingenstein is a senior environmental engineer who manages engineers, scientists and support personnel on a variety of tasks and projects, and is personally involved in both engineering and environmental study projects. His background incorporates both civil engineering and environmental engineering, with particular emphasis on wastewater treatment and water pollution control. Mr. Klingenstein has considerable expertise in both industrial and municipal wastewater collection and treatment systems, pretreatment, waste minimization and environmental monitoring. Mr. Klingenstein provides expert technical support to USEPA and USDOJ in environmental enforcement actions. He is also an experienced trainer, who has presented workshops on a variety of water pollution control-related topics. Mr. Klingenstein has significant experience in Quality Assurance. He was QA Reviewer on drinking water work assignments, for work assignments carrying out FDF reviews, for the Sludge Program Support WA under the former EPA OWEC contract, and was the Contract QA reviewer on SAIC's Stationary Source Compliance Division contract with USEPA. Mr. Klingenstein is a licensed Professional Engineer in Arizona, New Jersey and Indiana.

EMPLOYMENT HISTORY

November 1981 to present: Science Applications International Corporation (SAIC)

NPDES Program Enforcement

Mr. Klingenstein currently manages tasks under which SAIC provides expert witness support to the USEPA Office of Water Enforcement and Compliance Assurance in civil and criminal proceedings involving NPDES violations by both industrial and municipal facilities.

Mr. Klingenstein is also currently managing and providing expert technical support to several civil CWA cases under direct contract to USDOJ. Mr. Klingenstein's principal expertise is in the areas of wastewater collection and treatment, and remedial measure cost

estimation. For the past several years, a significant portion of Mr. Klingenstein's work has centered on wastewater collection systems. This work has specifically dealt with the issues of SSOs and CSOs, and the development of remedial measures to eliminate SSOs, and the development of Long Term Control Plans for CSO systems.

In providing this support to USEPA and USDOJ, Mr. Klingenstein has prepared background and expert reports, assisted USDOJ and USEPA attorneys in preparing for depositions, filings and hearings, has assisted in the taking of depositions, has been deposed, and has testified as an expert witness. Mr. Klingenstein has filed affidavits and declarations on the part of the United States and has participated in numerous settlement negotiations.

Mr. Klingenstein has (or is) provided expert support on the following cases: Fort Smith, AK; PennTech Paper; Menominee Paper; Tyson's Chicken; Gary, IN; Purnell Sausage; Gorton's of Gloucester; O'Donnell-Usen; Terra Haute, IN; Winchester, KY; Hawaii Kai (criminal); Bunnell, FL; METRO DADE (Miami, FL); TARACORP, Inc.; Florida Cities (FL); Gulf Chemical; Toledo, OH; Jefferson County, AL; Quaker State; San Diego, CA; Boston Harbor (MWRA); Hamilton County, OH; Toledo, OH; New Albany, IN; Indianapolis, IN; Youngstown, OH; IBP, Inc.; Fort Wayne, IN; Portland, OR; PSF, Inc.; Baltimore, MD; Baltimore County, MD; WASA; WSSC; Anderson, IN; and ALCOSAN (Allegheny County Sanitary District).

Mr. Klingenstein was Manager of SAIC's Work Assignment to carry out NPDES Compliance Inspections for the U.S. EPA Office of Wastewater Enforcement and Compliance. Under this Work Assignment, Mr. Klingenstein personally carried out, and directed other SAIC staff in carrying out, compliance inspections of NPDES permitted facilities. In these inspections he was called upon to evaluate wastewater treatment and sludge handling unit processes and equipment adequacy, determine causes of permit noncompliance and suggest appropriate remedial actions and system modifications.

To date, Mr. Klingenstein has personally evaluated and/or inspected hundreds of POTWs and industrial facilities. Mr. Klingenstein has experience with the following industries: metal finishing, pharmaceutical, food processing, iron and steel, nonferrous metals, pulp and paper, and textiles. Mr. Klingenstein was also an instructor in SAIC's program to instruct EPA and State employees in conducting NPDES compliance inspections. He also was involved in the extensive revision of a Diagnostic Inspection Manual for U.S. EPA.

Sewage Sludge Program

Mr. Klingenstein was the QA reviewer for the Sewage Sludge Program Support WA for two years. In this role he oversaw all QA on this WA, and was directly involved in a number of technical efforts. Mr. Klingenstein was also primary technical reviewer on the sewage sludge permitting manual developed by SAIC for USEPA

Mr. Klingenstein oversaw the technical review of raw data collected during USEPA's 1988 Sewage Sludge Use and Disposal Survey. Mr. Klingenstein was also involved in an evaluation of the sludge handling capabilities of four New York area POTWs. This work was carried out at the request of USEPA as part of the ongoing process of the phasing out of ocean disposal of municipal sludge. He also managed several WAs involving the monitoring of sewage sludges to be dumped at sea, as part of the reissuance of ocean dumping permits for New York City-area POTWs.

Mr. Klingenstein was responsible for drafting the sampling sections of a Sludge Sampling and Analysis Guidance Document for U.S. EPA.

Safe Drinking Water Program

Mr. Klingenstein was the QA Reviewer on SAIC's WA to provide engineering support for the Disinfection Byproduct Rule (DBPR) and Enhanced Surface Water Treatment Rule. Under this WA, SAIC produced seven guidance documents dealing with various aspects of these drinking water regulations.

Mr. Klingenstein was heavily involved in the 1997 Information Collection Rule Initial Sampling Plan Review effort. In this effort, he oversaw the development and execution of the technical and regulatory reviews of Initial Sampling Plans submitted by hundreds of Public Water Systems.

Mr. Klingenstein was Work Assignment Manager of a project for USEPA under which extensive investigation of several drinking water disinfection topics was carried out, and several technical documents were produced.

Mr. Klingenstein was selected and trained as a RAM-W trainer by Sandia National Laboratories, and has subsequently carried out several RAM-W training classes. Mr. Klingenstein has also contributed to USEPA projects involving the development of drinking water infrastructure security guidance.

National Pretreatment Program

Mr. Klingenstein is currently Project Manager for SAIC's development of local limitations for the Joint Meeting of Essex and Union Counties (a local authority).

Mr. Klingenstein was Project Manager for SAIC's development of a Statewide Pretreatment Management Program for the N.J. DEP. This Program controls industrial discharges to 64 small-to-medium size POTWs throughout New Jersey. Mr. Klingenstein was also Project Manager of a statewide sampling effort carried out as part of the Statewide Pretreatment

Management Program. Mr. Klingenstein was also Project Manager of efforts by SAIC to develop an Industrial Pretreatment Program for the North Bergen Utilities Authority.

Mr. Klingenstein was involved in an EPA/SAIC program which provides technical assistance to large POTWs in the development of industrial pre-treatment programs. As part of this project, he visited POTWs to assess existing pretreatment programs and recommended assistance strategies for these programs. He also developed and carried out monitoring programs to assist POTWs in developing technically-based local limits.

Marine and Estuarine Protection

Mr. Klingenstein participated in the development, and presentation of a training course on support of marine statute enforcement actions. This course, developed and presented under USEPA contract, was presented to an audience which included USEPA, Coast Guard, and Army Corps personnel.

Mr. Klingenstein was Task and Work Assignment Manager on several field programs for USEPA's Office of Marine and Estuarine Protection. These programs have included a Combined Sewer Overflow Floatables Study in New York harbor.

Pollution Prevention

Mr. Klingenstein provided technical support to a waste minimization program conducted at the Louisiana Army Ammunition Plant. This project involved the development of a hazardous waste generator/on-site treatment data base, the prioritization of waste streams, the examination of hazardous waste generating processes and treatment facilities, and the recommendation of waste minimization options.

As part of an SAIC contract with the Huntsville Division Corps of Engineers, Mr. Klingenstein was involved in a Study of Army Material Command (AMC) plating/metal finishing facilities. The objective of this study was to recommend methods of reducing or eliminating metal finishing wastes using proven state-of-the-art engineering principles. Recommendations were weighed against legal, institutional, technical, and environmental constraints.

Mr. Klingenstein was involved in an audit of the Anniston Army Depot carried out by SAIC. In this effort, Mr. Klingenstein evaluated the depot's electroplating facility with regard to energy usage, wastewater generation rates and treatment efficiency. This study made recommendations for means to improve wastewater treatment efficiency and reduce energy usage by the facility.

Treatment System Design and Operation

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Mr. Klingenstein managed an effort by SAIC to develop a specification for a Metal Finishing Wastewater Treatment System for the Naval Avionic center in Indianapolis, Indiana.

As Field Engineer, Mr. Klingenstein was responsible for SAIC's modification of an electroplating wastewater treatment system for a major airline. In this capacity, Mr. Klingenstein oversaw system start-up and conducted testing necessary to optimize system performance. Mr. Klingenstein was also involved in the design and construction of modifications to this wastewater treatment system. Mr. Klingenstein was also involved in SAIC's program to provide technical support to this airline's treatment system operations.

Mr. Klingenstein supervised the start-up of an electroplating treatment system designed and installed by SAIC at the Tobyhanna Army Depot. In addition to conducting performance evaluation testing at this facility, Mr. Klingenstein was also responsible for designing and overseeing construction of the wastewater segregation and collection system. This responsibility included the sizing and specifying of all pumping equipment used in the system.

Multi-media

Mr. Klingenstein provided technical support to USEPA on a multimedia enforcement effort involving a major organic chemical manufacturer. In this effort, Mr. Klingenstein was the lead on CWA compliance evaluation efforts.

Mr. Klingenstein supported a multi-media enforcement effort involving a non-ferrous metals molding facility. In this effort, he provided technical opinions on RCRA categorization and NPDES related issues.

Mr. Klingenstein participated in a multi-media environmental audit of the Lawrence Livermore National Laboratory, in which he evaluated the compliance of laboratory facilities with Federal, State, and DOE regulations pertaining to wastewater discharge.

Mr. Klingenstein was the Project Manager for SAIC's contract to provide on-going engineering support to a major housewares manufacturer. In this project, SAIC assisted this firm in the areas of air and wastewater pollution control and permitting.

Mr. Klingenstein was Project Manager of a Study of Household Hazardous Wastes which SAIC carried out for the New Jersey Hazardous Waste Facility Siting Commission. This study investigated the means by which household hazardous wastes are disposed of in New Jersey, and compared those means with those used in other states.

Site Remediation

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Mr. Klingenstein was involved in providing technical support to SAIC'S RI/FS effort for the Stringfellow (CA) Superfund site. In particular, Mr. Klingenstein was involved in the technical and economic evaluation of contaminated groundwater treatment technologies.

NPDES Permitting/Regulatory Development

Mr. Klingenstein was involved in an EPA/SAIC program to provide technical assistance to states in the development of industrial permits. In this program Mr. Klingenstein visited industrial sites, formulated recommendations for the development of specific permit limitations, and developed permit fact sheets. His permitting experience involves pharmaceutical facilities, lead smelters and iron and steel manufacturers. In addition, in one of his enforcement cases, Mr. Klingenstein was qualified before a Federal Court as an expert in the interpretation of municipal permit language.

Mr. Klingenstein was involved in the Effluent Guidelines Division's Revision of the Contractor's Engineering Report, Organic Chemicals and Plastics and Synthetic Fibers (OCPSF) Industries. In doing so, he assisted in the evaluation of costs and treatment technologies associated with proposed regulations for the OCPSF industry.

June 1981 to October 1981 - Clinton Bogert Associates

Mr. Klingenstein was an environmental engineer with Clinton Bogert Associates. In this position he was involved in the Bergen County Industrial Waste Survey effort as part of the Bergen County Pretreatment Program Development Project.

June 1979 to June 1981 - Burns and Roe Industrial Services Corporation

Mr. Klingenstein was an Environmental Engineer with Burns & Roe Industrial Services Corporation. While with Burns & Roe Mr. Klingenstein was involved in numerous field sampling programs, which included efforts at POTWs and industrial sites.

Mr. Klingenstein was also involved in drafting and revising several documents for EPA. In one significant effort, he was responsible for updating the background literature used in revising the Federal Guidelines for state and local pretreatment programs.

Mr. Klingenstein was involved in a pilot treatability study for coal gasification wastewater. In this program Mr. Klingenstein was responsible for the detailed design, construction and optimization of a bench-scale treatment system consisting of steam stripping, phenol extraction, and activated sludge treatment.

June 1975 - August 1975, June 1976 - December 1976, June 1977 - December 1977 - Philadelphia Water Department

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Mr. Klingenstein was a full time environmental engineering intern with the Wastewater Treatment Department of the Philadelphia Water Department. He supported the City's program to upgrade its three major wastewater treatment plants to meet the requirements of the CWA. He also set up and operated pilot treatment units at the Northeast Wastewater Treatment Plant, as part of engineering studies carried out to identify appropriate treatment technologies to employ in upgrading the plant.

PROFESSIONAL LICENSES AND MEMBERSHIPS

Professional Engineer, New Jersey (1985 to present)
Professional Engineer, Indiana (1990 to present)
Professional Engineer, Arizona (1996 to present)
Water Environment Federation
American Society of Civil Engineers

PUBLICATIONS/PRESENTATIONS

"Control and Generation of Sludge"; presented at the Third Annual Sludge Management Conference, Tulsa, OK, September 27, 1984; sponsored by Oklahoma State University and the Oklahoma Department of Health.

"USEPA's Proposed Sludge Regulations"; New Jersey Water Pollution Control Federation 74th Annual Conference, Atlantic City, N.J.

AWARDS/GRANTS

Recipient, SAIC 1989 Environmental Achievement Award
Recipient, IR&D grant to conduct independent research into certain operational characteristics of biological treatment systems.